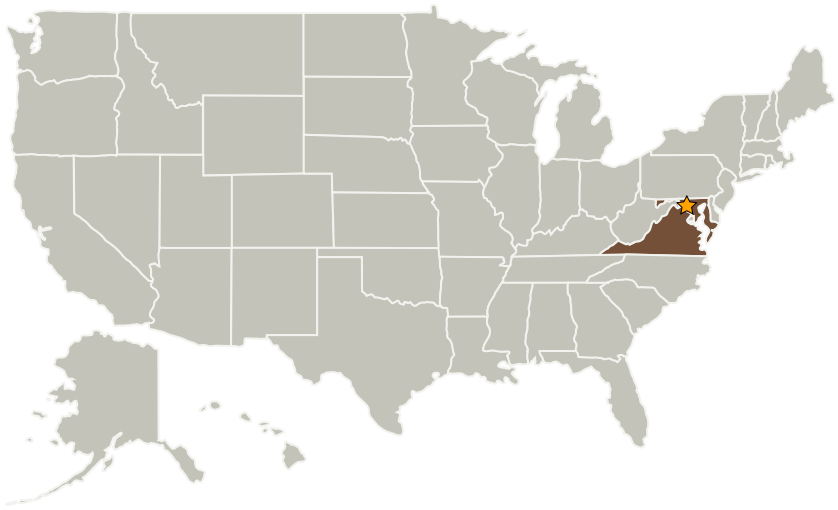
High Reliability Oscillators for Terahertz Systems, Phase II

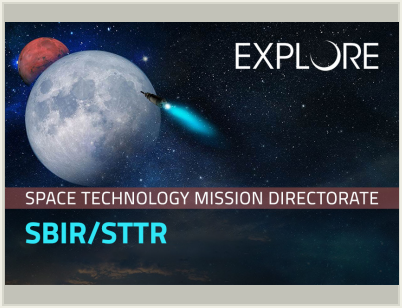
Completed Technology Project (2007 - 2009)

Project Introduction

To develop reliable THz sources with high power and high DC-RF efficiency, Virginia Diodes, Inc. will develop a thorough understanding of the complex interactions that occur within a chain of nonlinear frequency multipliers. These nonlinear interactions can cause rapid variations in power as the frequency or input power are tuned, including nulls and power surges that can damage individual components. Today, these problems are mitigated in three ways; i) mechanical tuning or bias adjustments, ii) laborious tweaking of each component in the chain until acceptable system performance is achieved, or iii) reduction of the system bandwidth and/or power specifications to avoid the most dramatic effects. However, each of these "solutions" either fundamentally limits the electrical performance of the terahertz source or dramatically reduces the ease-of-use of the system. This proposed effort represents the first systematic study of the complex interactions between cascaded nonlinear multiplier stages, with the goal of developing new multiplier and system designs that will reduce these unwanted effects. The resulting terahertz sources will achieve greater reliability, efficiency, bandwidth, and ease-of-use. In addition the new design rules will greatly reduce system design cycles and enhance manufacturability, thereby reducing costs. The knowledge gained through this research will be used to achieve vastly improved terahertz sources for NASA's atmospheric and radio astronomy missions; as well as a wide range of emerging commercial applications such as imaging systems for security screening and industrial process control.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Virginia Diodes, Inc.	Supporting Organization	Industry	Charlottesville, Virginia

Primary U.S. Work Locations	
Maryland	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.4 Flight and Ground Systems